

**Alternative 18**

**Delta Island Protection with Storage**

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#### **Emphasis**

This alternative combines key levee and channel improvements, in-Delta storage, habitat restoration, and flow barriers to achieve moderate reductions in levee system vulnerability, improvements in Delta aquatic and terrestrial habitat, and equitable water supply flexibility. Diversions are relocated to reduce fish impacts, and water is purchased for environmental management.

#### **Distinguishing Features**

##### Physical and Structural Features

Improves all Delta levees (project and non-project) to a moderate level of protection equivalent to either the hazard mitigation plan (HMP) or Public Law (PL) 99 standard to reinforce the existing physical configuration of the system against catastrophic failure. A moderate level of habitat restoration is recommended for the Delta, Suisun Bay, and Sacramento River areas. Flow and migration barriers are included for management flexibility.

##### Operational and Management Features

Modifies upstream reservoir operations primarily for water quality purposes (diversion and release timing) and for equitable distribution of "water gains" achieved through demand reduction actions. Reclamation and conservation are emphasized, and discharge management programs are strengthened. Water purchases (100 TAF) and additional in-Delta and upstream storage increase flexibility.

##### Institutional and Policy Features

Provides incentives for groundwater banking and conjunctive use, water transfers, and development of alternate supplies. Land retirement and fallowing achieves both demand reductions and water quality improvements.

#### **Benefits**

- Moderately protects all Delta levees and physical configuration/land uses
- Moderately improves in-Delta and export water quality
- Restores medium and high-priority Delta and Sacramento River habitat
- Improves operational flexibility (storage and purchases)

#### **Constraints and Concerns**

- Removes agricultural land from production
- Does not achieve substantial export supply gains



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Actions to improve system reliability, such as channel improvements and levee maintenance and stabilization, modifying agricultural practices to reduce subsidence, providing funding for maintenance and stabilization, and maintaining and/or /reconstructing levees around infrastructure are implemented at moderate levels to reduce the risk of the Bay-Delta system, including water supply, water quality, ecosystem quality, existing land uses/infrastructure, and recreational values to catastrophic failure.

#### **Physical and Structural Features**

***Flood Protection Level***— This action provides a moderate level of protection to Delta system levees. First, all levees not yet providing a level of protection equivalent to the hazard mitigation plan (HMP) will receive the necessary upgrades to their levees to meet HMP standards (note: approximately 50 Delta islands may already meet the HMP standard). A level of flood protection equivalent to the US Army Corps of Engineers' Public Law (PL)- 99 standard would be provided to: 1) critical western Delta islands (such as Sherman and Jersey islands), and islands with important regional infrastructure (e.g. the Mokelumne Aqueduct, transmission lines, Highway 160, etc.); and 2) islands with both valuable habitat and infrastructure (such as New Hope Tract, Bouldin Island, Palm Tract, Lower and Upper Jones Tracts, and Lower Roberts Islands). Some Delta islands such as Sargent Barnhart and Bishop Tract are already at a standard higher than HMP but may or may not meet PL-99 standards.

***Channel Improvements and Levee Maintenance***— A moderate level of channel improvements (e.g. widening for improved conveyance), levee maintenance and stabilization (e.g. stabilizing berms), the modification of agricultural practices to reduce subsidence potential, setback levees, providing funding for maintenance and stabilization, and maintaining and/or reconstructing levees are indicative of the range of actions that would be implemented with the intent of reducing the risk of the Delta levee system with respect to its value in providing water supply, water quality, ecosystem quality, and land use/infrastructure benefits.

***Construct In-Delta Storage***— Core actions such as increasing water supply predictability are implemented at higher levels by converting existing leveed lands to storage reservoirs (such as Mandeville Island). This serves to capture water during high flow periods to provide water supply for Delta outflow management. Conversion of islands to storage modifies existing land use, but assists in maintaining the existing physical configuration of the Delta.

***Develop Additional Off-Stream Storage***— Core actions such as increasing water supply predictability are implemented at moderate levels by constructing new off-stream storage along the west side of the San Joaquin Valley. This serves to improve the reliability of Delta as a source of export water supply. Sites could be expanded to include a facility adjacent to the California Aqueduct (such as the proposed Los Banos Reservoir).

***Delta Levee Habitat Restoration***— Restore approximately 100 levee miles of shallow water, riverine and riparian habitat in the Delta to provide forage and cover habitat for resident and anadromous fish, and to provide other benefits associated with riparian habitat. Actions might include setback levees, creation of berms, creation of shallow water habitat, and increased vegetation on levees in coordination with efforts to improve flood protection. Considerations for site selection will include distance from hazards such as pumping plants, protection from waves generated by wind and boat wakes, importance of island integrity to the maintenance of Delta water quality, and need to improve channel capacity and structural stability of levees. Good candidate areas are Twitchell Island along Three-mile Slough and Seven-mile Slough, Georgiana Slough, and the north and south forks of the Mokelumne River.

***Delta Habitat Restoration***— Restore shallow water and tidal wetland habitat in the Delta to provide spawning areas, forage areas, and escape cover for juvenile salmon, Delta smelt, splittail, and other species. The restoration of riverine, riparian, wetland, and adjacent terrestrial habitat, and expansion of floodwater habitat channels and meander belts in the Bay-Delta and upstream in rivers and tributaries to restore fish spawning, rearing, and feeding habitats and improve fish survival are implemented at moderate levels at sites having the greatest potential for achieving habitat improvements. Candidate areas include Prospect Island, Liberty Island, Little Holland Tract, Decker Island, Hastings Tract, Yolo Bypass, and the southeast Delta. Also restore shallow water shoreline habitat along margins of the lower Sacramento and San Joaquin river channels, and tributary sloughs including Georgiana Slough, Barker Slough, Lindsey Slough, and Parker Island. Riparian, wetland, and terrestrial habitat would also be restored on Delta islands and upland areas adjacent to river channels.

***San Joaquin River Habitat Restoration***— Restore channel features to improve fish survival. Actions may include restoration of deeper, narrower channel areas to keep water cooler, and isolation of quarry areas to protect young fish from predation and straying.

***Bay Habitat Restoration***— Restore about 2,000 acres of tidal wetlands between Collinsville and Carquinez Strait. Actions may include conversion of diked wetlands to tidal wetlands or the use of dredge spoils to create wetland areas. The resulting habitat types will provide wet year spawning habitat for Delta smelt, rearing areas for salmon, as well as habitat for diverse wildlife, including canvasback and redhead ducks.

**Channel Islands**— Restore and protect channel islands. Evaluate the contribution of upstream meander belts to sediment deposition at channel islands. Establish zones for different types of boating use to protect some areas and adjacent levees from large boat wakes.

**Other Programs**— Implement recommended habitat restoration actions from other programs, including the CVPIA and the Anadromous Fish Restoration Plan. Examples of specific actions include small dam removal on Clear Creek, dam removal on Battle Creek, and the establishment of a population of winter run chinook salmon on Battle Creek.

**Sacramento River Habitat Restoration**— Restore riparian, shaded riverine, and shallow water habitat along the Sacramento River from Sacramento to Collinsville. First step will be to provide matching funds for Corps of Engineers feasibility study. Subsequent restoration would be funded 75% by COE.

**Fish Screens**— Install fish screens on diversions over 250 cfs that are on fish migration routes in the Delta, rivers, and tributaries.

**Improve Pollutant Source Controls**— Identify and control high priority pollutant sources through a combination of source reduction and treatment actions. These actions would provide for an array of increased source reduction activities such as additional regulation of agricultural and urban drainage and better enforcement, establishing BMP's for a range of activities affecting Delta water quality such as levee maintenance and pest control practices, and supporting and enhancing existing land retirement and fallowing programs.

Apply core level actions such as implementing source control regulations for pollutants, levee maintenance best management practices to encourage use of materials compatible with good water quality, retirement of lands with serious drainage disposal problems, retirement or fallowing agricultural lands with salt or other contaminant drainage problems to reduce land-derived salt contamination, management of irrigation tailwater, retention and management of stormwater runoff, and management of discharges from abandoned mining sites to improve water quality management.

Implement on-site mine drainage remediation measures based on requirements in current regulations. Provide regulatory incentives and develop institutional agreements to enable the focusing of funding resources on priority sources. Give urban areas flexibility to fund high-priority mine cleanup in lieu of increasing expenditures on treatment plant improvements through changes in water pollution requirements

**Install Barriers**— Construct flow and fish barriers to better manage water movement in the Delta, minimize reverse flows and salinity intrusion, and facilitate fish migration into and out of the Delta. Potential fish barrier locations include the Delta Cross Channel, Georgiana Slough, and Three Mile Slough. Construct tide gates and/or flow barriers in the

southern Delta to better manage south Delta water quality. Operation of the fish barriers would be coordinated with real time monitoring of anadromous fish population and movement.

### **Operational and Management Features**

***Modify Timing Releases***— Using real time flow monitoring and adaptive management, manage upstream reservoir releases from New Melones, Folsom, and other reservoirs both seasonally and annually to improve Delta water quality through dilution of land - and activity-derived contaminants, and ocean salinity repulsion. Implementation is at a moderate level. Modify Sacramento and San Joaquin Valley and export area reservoir releases and groundwater storage releases in conjunction with upstream operations to accommodate system demands. Focus the timing of releases on water quality improvements while also providing (to a lesser degree of emphasis) instream aquatic habitat benefits (such as improved temperature levels and optimal flows).

***Modify Timing of Diversions***— To improve Delta water quality, manage the timing of Delta diversions to increase selected Delta channel flows during poor water quality conditions. Increase export capacities and/or rates when and where flows are not needed for water quality improvements (such as during surplus flow conditions in wet winters). Modify operations in coordination with other water quality and supply related actions so that benefits are equitably distributed across ecosystem quality, water supply, and water quality objectives.

***Manage Irrigation Tailwater to Reduce Pesticides***— Utilize wetlands, treatment processes, or holding reservoirs to store or retard surface agricultural drainage, reduce pesticide concentrations, and/or make releases during higher instream flow periods.

***Retain and Manage Stormwater Runoff***— Utilize wetlands, treatment processes, or holding reservoirs to reduce contaminant concentrations and to store or retard contaminated flows and stormwater drainage for release during periods of higher instream flows.

***Conservation***— Conservation and water pricing are implemented at moderate levels to reduce water demand. Residential, industrial, and agricultural demand reduction in and upstream of the Delta are implemented at moderate levels to increase Delta inflows in drier water years as needed to meet delivery and environmental obligations. Measures capable of achieving an equivalent, equitable level of demand reduction are implemented in the export areas to improve the reliability of the Delta as a source of export water supply.

***Reclamation and Alternative Supply Development***— Reclamation and other cost-effective management of urban and industrial discharges and runoff are implemented at moderate levels to improve Delta water quality. Purchase 100,000 acre feet from sources on the San Joaquin River system to benefit fish. Uses might include pulses to aid fish movement, dilution of poor quality San Joaquin river flows, or exchange with export customers at critical times so Delta exports could be curtailed. Operation of Clifton Court Forebay would be modified to reduce intake of fish. Develop alternative water supplies such as desalination and potable reuse for export areas to provide current dry year needs. Coordinate these actions with conservation and reclamation actions to ensure that long-term water management flexibility gains are not lost to concurrent increase in future demands.

### **Institutional and Policy Features**

***Groundwater Banking and Conjunctive Use***— Incentives for conjunctive use are implemented at moderate levels to enhance available water supplies. Groundwater is stored south of the Delta to increase the reliability of drought supplies. Increase support of efforts to provide economically attractive opportunities for groundwater banking and conjunctive use during drier water years.

***Land Retirement and Fallowing***— Implement retirement of marginal agricultural lands and other irrigated lands from willing sellers at moderate levels. Fallow enough land during drought periods to equitably reduce current deficiencies while maintaining ecosystem quality at acceptable levels. Land retirement and fallowing of lands adjacent to levees can control subsidence and is potentially available to replace habitat lost due to levee maintenance and stabilization actions. Land retirement and fallowing in the Delta can also reduce the organic content of Delta water used for export purposes or provide islands for conversion to storage.

***Water Transfers***— Water transfers are implemented at moderate levels to increase water supply predictability. Facilitate additional water marketing during drier water years to increase the efficient utilization of existing water supplies.

***Subsidence Reduction***— Efforts to reduce the subsidence on Delta islands with deep peat soils (such as parts of Grand, Twitchell, Sherman, Andrus, and Bouldin islands) will include the establishment of a landside buffer zone between 25 and 50 yards in width, located adjacent to the levee.

***Emergency Levee Management Plan***— An emergency levee management plan would provide necessary funding and direction to reclaim Delta islands in the event of inundation to continue protection of Delta functions as an integrated resource system. Funding would

be provided to ensure that a suitable amount of equipment and materials would be readily available to rapidly respond to flood fights.

## **Preliminary Assessment**

### ***Benefits***

**Ecosystem Quality**— This alternative would improve ecosystem quality through habitat restoration and instream flow management above current values. The alternative integrates the linkage between flood control and beneficial uses of Delta water supplies through increased flood control actions. This alternative also advances opportunities for protection and large-scale enhancement of habitat elements that have been modified and are currently inadequate. Land retirement and fallowing in the Delta, accompanied by active management of such retired lands for wildlife (e.g. seasonal wetlands) could provide areas for habitat restoration. The incorporation of concentrated large amounts of habitat on flooded islands will tend to create independent tracts of valuable habitat. Water supply, habitat, and fish protection issues are further addressed by creation of off-stream and in-Delta storage, by conversion of existing non-tidal wetlands to tidal wetlands and/or inundation of islands to create new wetlands, and diversion and real time monitoring measures to protect fish. Channel maintenance would improve conveyance of flood flows through the Delta and could include efforts to restore aquatic habitats in combination with waterside berms where current habitat is inadequate.

**Water Supply**— This alternative improves export water supply reliability by improving the reliability of the Delta as a source of water supply through demand reductions, additional storage facilities, and development of alternative sources of supply. Constructing facilities within and outside of the Delta would provide increased reliability of the Delta as a source of water supply. Conservation, both in the Delta and in other areas dependent on Delta waters, and land retirement and fallowing are used to reduce demand. Combining conservation, land retirement and fallowing, and wastewater reclamation reduces direct demand by reducing surface water diversions, or in some cases, groundwater pumping. Delta water supply reliability for in-Delta and export water supply is also improved through channel improvements and levee maintenance and stabilization actions from salinity intrusion by elevated levels of protection of the critical western Delta islands.

**Water Quality**— Water quality is improved through the key action of reclaiming agricultural, municipal, and industrial wastewater. Other water quality improvements are achieved by supporting and core actions including mine drainage

remediation. Reliability of Delta water quality is also improved through channel improvements and levee maintenance and stabilization actions at moderate levels. Water quality concerns for beneficial uses are addressed by improving flood protection and seismic resistance of levees on the critical western Delta islands such as Sherman, Jersey and Bradford. Land retirement and fallowing in the Sacramento and/or San Joaquin Valleys, or in other marginally productive areas dependent on Delta waters could lead to overall improvements in Delta water quality by reducing the areal extent of agricultural lands (and applied agricultural chemicals) contributing nonpoint and point discharges resulting from agricultural use.

***System Reliability***— Channel improvements and levee maintenance and stabilization actions at moderate levels further improve the reliability of the Delta from catastrophic inundation which protects existing and restored shallow water habitat, land uses, infrastructure, recreation, water supply and water quality. The vulnerability of these Delta functions to catastrophic failure is reduced by providing a moderate level of flood protection for all Delta islands.

Implementation of these actions will improve protection of those islands as well as protecting in-Delta and export water supplies from salinity intrusion due to island failure. These efforts reduce the vulnerability of islands with infrastructure and the vulnerability of islands with valuable existing habitat such as Bradford. Flood protection improvements of the levees around the critical western islands such as Sherman and Jersey and/or islands with critical infrastructure (i.e. the Mokelumne Aqueduct, Transmission Lines, Highway 160, etc.) such as Roberts Island increases protection of those islands. Continued protection of Delta functions as an integrated resource system is accomplished by an emergency levee management plan to provide necessary funding and direction to reclaim Delta islands in the event of inundation. These actions could be accomplished through expansion and continuation of existing programs such as the Delta Flood Protection Act of 1988 (SB 34) as well as sufficient funding of these efforts in the future. The moderate levels of protection for Delta islands will require development and funding of an emergency levee management plan to reclaim Delta islands, an emergency water supply plan to meet needs due to outages, and an emergency water quality plan to address intrusion of salinity due to catastrophic failure of Delta islands.

### ***Constraints and Concerns***

***Fisheries***— Though improvements to habitat and fish survival will occur, complete restoration of important fish populations may not be possible without reducing the use of the Delta as a water supply conduit and greatly reducing exports from the south Delta. Mortality in South Delta export facilities remains significant.

**Exports**— Export supplies remain highly constrained and vulnerable to interruption while export water quality remains problematic.

**Transfers**— Water transfer opportunities remain highly constrained because existing configuration is unchanged.

**Solution Principles**— Moderate ecosystem and vulnerability improvements without commensurate water supply benefits may violate principles.